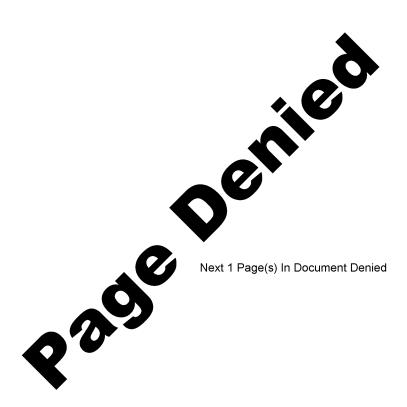
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ELECTRONIC APPARATUS FOR THE DIRECT REGISTRATION (Recording) OF A COMBINED CIRCULATION-METABOLISM TEST IN DAILY PRACTICE

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SUMMARY

Will report on a newly developed electronic measurement device with which it is possible to register the gystolic and dyostelic blood pressure as well as pulse and frequency of breathing. The recording corresponds to the scheme of the well-known Schellong Tests. A single assistant can make the measurements and are completely objective. After a suitable codification by means of a simple diagram atlas, this test produces a practical contribution for the automatic evaluation of a diagnosis. The apparatus is also suitable for a succession of examinations.

INTRODUCTION

The general, usual, unique measurements of blood pressure and pulse.

frequency used in daily practice supply only an unsatisfactory configuration for the determination of the condition of the patient's circulation. The individual measurements found are, on one hand subject to the subjective mistakes on the part of the physician and on the other hand are influenced by the psychological tensions at the moment of the measurement.

Considerably more illuminating is a circulation-metabolism test

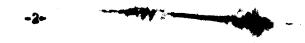
assording to Schelleng, whereby generally after physical exertion IC single
measurement of pulse frequency are determined at minute intervals. For the
execution of the Schelleng tests according to the stated technique, one
physician and one to two assistants are needed.

By means of the described apparetus this test can be completely objectively described by one single assistant. The examination diagram is drawn-up (shown) directly and it is further possible to determine the atom frequency automatically on the same recording tape.

It is possible, without any difficulty, to execute further tests such me the "One or two-step-test" or the so-called "Cold Prespure Test" with this instrument.

The measurement of the blood pressure id done without blood (bloodlessly) according to the method of Riva-Recci by means of the upper annougle.

* Must be "breath" - typing error possible here



The writing instrument of the registration apparatus is moved directly over a pneumatic system by means of the pressure of the suff. By means of a special microphone the Korotkoff tones are recorded in the usual menner above the cubital entery. The recording instrument which runs from right to left across the recording paper during the decreasing air pressure, marks a point on the registration paper for every wordkoff tone. The point which is recorded first represents the systolic point and the point drawn-up last denotes the dystolic blood pressure. The connecting line of these end points which is to be made by hand after the recording is uffinished, gives the pattern of the blood pressure according to Schelleng.

During every single measurement of plood pressure a condenser is set-up over a step switch relay efter a certain number of Korotkoff tones i.e. pulse waves. This tension which is immediately stored up on the condenser is a measurement for the pulse frequency. This stored-up tension is compared to an indication of a proportional tension of the recording instrument during the inflation phase of the cuff and the corresponding recording mark of the pulse frequency is shown in the measurement of equal tension. These measurement marks are united with each other after the measurement is finished just as the markings for the maximum and minimum values of the blood pressure; here however, the marks for the pulse frequency have to be placed before hand at the moment (point of time) of the corresponding blood pressure registration.

Finally, the breath frequency is shown analogically to pulse frequency during which time the breath impulse giver consists of a simple contact giver which is activated by the breath stream of the patient.

II Details of Construction

The achemetic construction lets us recognize the individual construction of the instrument.

The pneumatic writing system is directly coupled with the pressure suff and san be filled with air pressure in the well-known way by means of a rubber bulb. The deflation is made possible through pressure valves; which enable one to choose different speeds for the deflation. After inset of the first Korotkoff tone one should lesson the speed of the deflation: to such a degree that approximately 10 Korotkoff tones reach the recording.

However, an automatically working additional-instrument with a compressor can be connected. The regulation of the inflation and deflation of the ouff

is accomplished with an automatic device on the one hand through the end contacts which are placed on the final marks of the recording instrument, and on the other hand through a time switch mechanism for the determination of the spaces for the individual measurements. The instrument has two areas of measurements

. 0 180 am Hg and

0 ... 360 mm Hg

per minute and a breath-pulse-measurement area of 10 . . 40 breaths per minute and a breath-pulse-measurement area of 10 . . 40 breaths per minute which is connected to the pulse-frequency-measurement area 40 . . 180 beets per minute. Assording to this method only a unified pressure is necessary.

Of extreme importance during the measurement is the secure position of the patient's arm which is achieved by having some form of supports.

The Korotkoff microphone as it has been used most recently consists of an open capsule which is placed over the cubital artery and also (consists of) a crystal minrophone which is attached to an adjustable stand, whereby the capsule is connected with the microphone through a hose. By this means the frigative sounds are few.

The cuff remains strapped on the patient during the charge.

The strengthened Korotkoff tones guide the relay Rel. 1 whose temmination is proportional to the intensity of the Korotkoff tones.

By means of an earphone the quality of the Keyetkoff tones (em be determined. Moreover, the described apparatus is construced in such a way that it can be used as an electric stethoscope at the same time.

The condenser C_p which serves for the pulse measurement is leaded ever the step-emitch-relay Rel. 2 during the duration of three emitch-steps. The tension of the condenser, which is a measurement for the pulse frequency is compared to tension U_p by means of tube T 1. The tension U_p is turned on by potentiameter P which is connected to the axis of the recording instrument. The line of demarkation of this potentiameter is set up in such a way that the pulse frequency is shown linearly. During equal tension Pol. relay Rel. 3 switches on and registers the pulse frequency.

The instrument which gives the breath frequency consists of a fell which is moved by the breath excess of the patient; this fell is furnished with a contact equipment. This instrument is moved back and forth in first of the patient's mouth and does not better him. The contact regulates a flightless

switch which switches relay Rel. 4 whereby the recording analogous to the pulse frequency recording on the scale area 10 -40 is accomplished (relay Rel. 5). At the scale value 40 the switching over the breath frequency condenser C_B is accomplished automatically on the pulse frequency condenser C_B by means of relay Rel. 6.

Moreover, point marks can be written on the edge of the seconding paper by means of a special writing instruments these point marks note the individual phases of the sirculation test and are put in by hands

For the correct termination of the entire recording sequence, and for the correct eutomatic regulation some additional relays and various amican contacts are necessary which are not presented here, that is, are not explained here, for example the preparation for the zero position of the step-entire relay, needs contacts for the pointers, switch contacts for relay Rela 6 and so forth.

The accuracy of the inset of the recording instrument is guaranteed through the fact, that during the measurement procedure the recording instrument vibrates alightly. By this method tendancels of remaining in the time place, that is particularly relating to jerky movement of the instrument (pointer) is suited out.

The apparatus is approximately the size of a postable typewritera,

The emaple of registration shows the characteristic procedure of the simulation test one a patient with a hypotoen disturbance in the metabolism during the Statuersuch attempt.

By the number of disturbances in the metabolism, the test first of all turns out uncharacteristically. The largest number of these are the eases which have a complete slip of the vegetative metabolism. The simple earrying out of the test justifies however, by such patients the carrying out of a greater number of measurements after certain prevocations, for exemple the prevocations of a medical for physical nature.

in most cases, a very satisfactory correlation with the blood pressure values which have been sequered directly. The procedure becomes useless only by very small amplitudes of blood pressure during which the Kerqtkoff tends became very weak. The indirect method generally measures a directlic blood pressure value which is the small when large blood pressure amplitudes one embassions.

This email percentage of patients to whom the described method connet be applied will be subject to specila examinations.

With consideration of this limitation the test represents an important foundation for the judgement of the condition of the circulation of a patient. Moreover, after accessary codification it is a useful contribution for a wantralized evaluation of a diagnosis; an evaluation whereby the pudification can take place through comparison of the recording tape with a whole diagnosis.

the simple handling of the appearatus is ideal for a succession of a circulation emulantions. Therefore, it can corve on a imposite heats for the almost feetier and early discovery of disturbances is the manual facility